



6/12/05

**Mr. Alan Rawson
Bureau of Materials & Research
New Hampshire Department of Transportation
PO Box 4833, 11 Stickney Avenue
Concord, NH 03302-0483**

Dear Mr. Rawson,

As per your letter of 3/11/05 we are applying for certification by the ESC for the following...

“706-13 Perforated Corrugated Polyethylene Underdrain Tubing.”

Subcategory...

**M252 M-96 single wall pipe less than 250mm I. D. (4” – 6” – 8”)
Type CP only. Manufacturing location: Lordstown, Ohio**

Cervell employs one full time quality control technician, Yolande Pursel, who reports to me directly. She has six years experience and has been trained on all of the test equipment in our ASTM/AASHTO lab. We have a single location and operate one production line.

The ESC inspectors are welcome to visit our facility anytime unannounced during regular business hours, which are 8:00AM to 4:30PM weekdays. All of our documentation plant facilities, and storage areas will be accessible.

Respectfully Yours,

**Larry Pursel
President**



**Cervell Drainage Products Inc.
Company Mission Statement
Rev4/05**

All Cervell Employees

The mission of Cervell is very simple: To supply high quality drainage products at a competitive price to our customers in the volume and product mix required; and to deliver the requested products to a certain location at a specified time.

We manufacture our own pipe in the sizes of 4" - 6" - 8" from basic raw materials and deliver the finished products with our own semi-trucks. In order to accomplish this there are many different specialized jobs in our organization from manufacturing, accounting, to CDL licensed truck drivers. But no matter what our specialized jobs are at Cervell there are two responsibilities that we all share in common: **SAFETY** and **QUALITY**.

We have an ongoing safety program and we all need to be mindful of safety to prevent accidents from happening in the workplace and in the field as well. It also behooves us all to do our part in maintaining quality standards. No business wants to get a reputation for having bad quality. Each one of us must develop a quality mentality because it is not just the QC department that is responsible for quality. We all play a part in maintaining quality - especially the coiler operator who handles every single foot of pipe produced. He should be on the lookout for both visible and physical defects at all times. The truck loader as well needs to be on the alert for defective product

that may have been damaged or any package that is not up to standard.

Our products are made to two main standards in the industry: ASTM and AASHTO. To show compliance, our molds are engraved with these specifications. AASHTO is a specification that is unique to highway pipe, which is mostly sold to contractors who do road work for state governments. (DOT - Departments of Transportation)

We need everyone's participation in the two areas of safety and quality control. This is necessary to maintain our present customer base as well as to guarantee our success in the future.

Larry Pursel

President



Eastern States Consortium (ESC)
(ME,NH,VT,MA,RI,CT,NY,PA,NJ,DE,MD,DC,VA,NC)

Polyethylene Pipe Manufacturers Approval Submission
Cervell Drainage Products Inc.
Lordstown, Ohio
QSM 4/05 Rev 10/15

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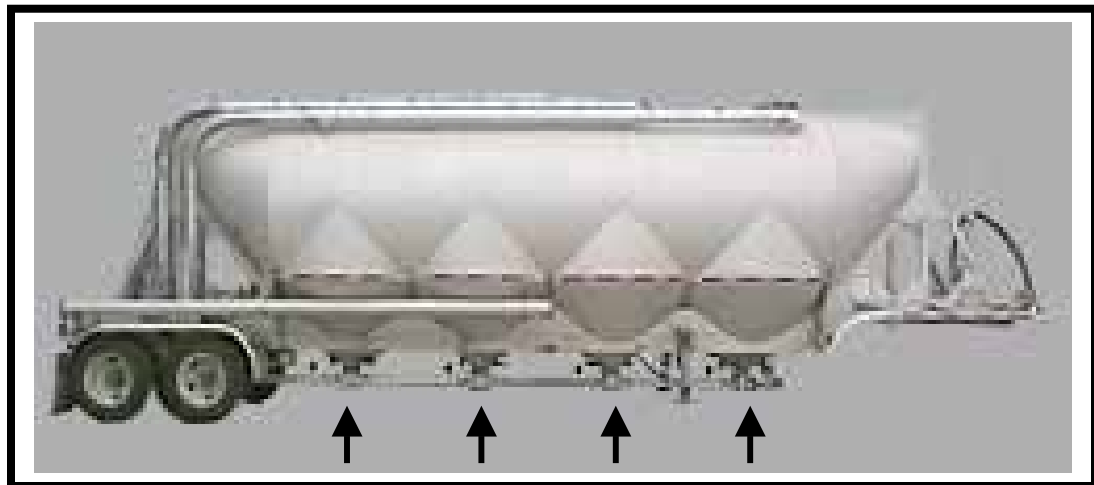
Quality Control of Raw Materials
QSM 5/05



Cervell Drainage Products Inc.
Raw Materials Testing Procedures
Rev 8/05

A. Bulk Truck Shipments

Bulk trucks are typically divided into four compartments. The material is blown from each compartment sequentially into a large gravity hopper in the plant and then it is boxed via a slide gate, which controls the flow of the material into the Gaylord. The bulk truck holds about 45-50,000#. We sample each individual compartment as it is being pumped through the system.



Bulk Material Trailer

The material must be tested before it can be used to make pipe. The melt index is tested as well as the density of the material in each of the four compartments. The samples are collected and marked as the bulk truck is unloaded. The operator informs us when he changes compartments while unloading.

The material supplier will provide test results on the melt index and density with each shipment - whether in bulk or gaylord.



Cervell Drainage Products Inc.
Raw Materials Testing Procedures
QSM 4/05

B. Gaylord Materials Testing

Materials are also be shipped to us in Gaylord containers of approximately 1,000 - 1,200#. Shown is an in-house sampling probe, which allows sampling all the way down to the bottom of the Gaylord. This sample is then dumped out of the end of the inner pipe, which is representative of the material from the full depth of the Gaylord.



Not every gaylord is sampled. One out of ten are sampled within a certain lot number. If there are multiple lot numbers in the shipment at least one sample for each lot number will be tested for melt index and density. Commonly, shipments of this order are up to a maximum of about 45-50 Gaylords per truckload.



↙ Probing

↑ Sampling



Dynisco Melt Indexer

Once the material is tested, a tag is placed on the container with the reference number relating to the test number. The general information is included on the tag showing the source and test info about the material. For inventory purposes we are now starting to use a barcode, which directly references the material test. The disposition of the shipment is then

distributed to either: return to supplier or use directl. Materials being evaluated or are in question are marked "HOLD DO NOT USE."

Next, a sample from the Dynisco melt indexer is cut and placed in our density column. (See below) The density is then determined relative to the several precision density standards in our water-cooled column.



Density Column

The test range of the density column is approximately .940 to .960+. Materials that are higher than .960 are tested in individual baths with the specific test density set in each bath with a hydrometer. In house reworked materials are not tested.

Color Concentrate Testing. A burn off is conducted on each incoming shipment of color concentrate to verify the percentage of loading. One test is conducted per lot number. Our usual purchased materials are 50 % by weight of Carbon Black.

Fittings

Our fittings are all supplied by other manufacturers. Haviland, Hancor, and Fratco. All fittings comply with AASHTO Specifications.



Cervell Drainage Products Inc.
Material Blending Procedure
QSM Rev 8/05

Raw Material Blending Procedures

The mixing procedure will be documented on your “Material Blending Log Sheet,” which will be submitted to the office daily along with the shift production and quality control sheets. This will allow us to track the material being used to our finished products.

All material to be blended in the vertical mixer will first be tested before it can be used on the pipe production machine. There is a unique test designation number for each Gaylord, which is represented as a removable barcode sticker. A blended production batch will consist generally of three or four of these individual Gaylords of raw materials - or approximately 3,500 pounds. Once blended, these three or more individual Gaylords will be considered as a single lot of material, which will be uniform throughout. The minimum mixing time is 20 minutes for each batch. The blended material has already been tested and needs no further attention or documentation. (Virgin, reworked, additives, and color concentrate.) **All materials blended will each be M252 approved. We do not mix unapproved materials together to produce M252 compliant blends.**

In order to make a batch of material in the vertical mixer, first weigh out all of the material on the platform scale and dump it into the mixer with the hydraulic Gaylord dumper. Record all of the weights on your logsheet. Next transfer each barcode sticker from the empty Gaylord containers to the log sheet or write down the barcode number or any information on the label. This will give us a better record of our material usage. And lastly, calculate the amount of needed color concentrate and add it to the mixture as well before starting the mixer motor. Record the total weight of the mix.

Ultraviolet Radiation Protection

The ASTM specification requires that we put a minimum of 2% (by Weight) of carbon black (not concentrate) into our pipe for UV radiation protection. AASHTO limits the content to no more than 5%. Carbon black in its natural form is very difficult to work with, so in order to be

able to handle and disperse it properly, it is intensively mixed and pelletized (using a twin screw extruder) usually with a certain amount of low density polyethylene as a carrier. The PE resin encapsulates the carbon black, which makes it manageable. This mixture is called masterbatch or concentrate.

We all need to be aware that masterbatches or concentrates can contain various loadings of carbon black. Common loadings are between 30% to 70% carbon black by weight. This has to be known in order to calculate the correct amount of color masterbatch to be added to your material mix. The lab will furnish this information to you after they do a burn off test of the color masterbatch sampling as it comes from our supplier. On highway pipe, the lab also does a daily burn off test on our finished product to determine the level of carbon black present.

In order to calculate the amount of color masterbatch needed for a mix, follow this formula...

Weight of resin in the mix x .021 (2.1%) = required amount of carbon black. (not concentrate)

Divide the needed amount of carbon black by the percentage of loading of the concentrate or masterbatch. Change the percentage to a decimal.

Example:

3,500,pounds of material. Multiply by 2.1 % (.021)

$3,500 \times .021 = 73.5$ pounds of actual carbon black needed.

Next divide 73.5 by the percentage of carbon black loading of the masterbatch. Lets say it is 34% (change to Decimal - .34) carbon black for example.

$73.5 / .34 = 216.2$ pounds of masterbatch.

If the masterbatch is 50% (.50) carbon black, the amount of color concentrate required would be...

$73.5 / .50 = 147$ pounds.

Add this amount of color concentrate to your mix as described above.

Cervell Drainage Products Inc

Material Blending Log Sheet Rev 4/05

Date ___/___/___ Shift _____ Operator _____ Color Lot# _____

Paste barcodes off Gaylords (or record barcode number) in the boxes below...

1.		2.	
3.		4.	

1. GW	_____	Tare	_____	Net	_____
2. GW	_____	Tare	_____	Net	_____
3. GW	_____	Tare	_____	Net	_____
4. GW	_____	Tare	_____	Net	_____

Total resin Net _____

Carbon black = Total Wt x .021 Net _____

Concentrate = Carbon Black x loading % Net _____

Paste barcodes off Gaylords (or record barcode number) in the boxes below...

5.		6.	
7.		8.	

5. GW	_____	Tare	_____	Net	_____
6. GW	_____	Tare	_____	Net	_____
7. GW	_____	Tare	_____	Net	_____
8. GW	_____	Tare	_____	Net	_____

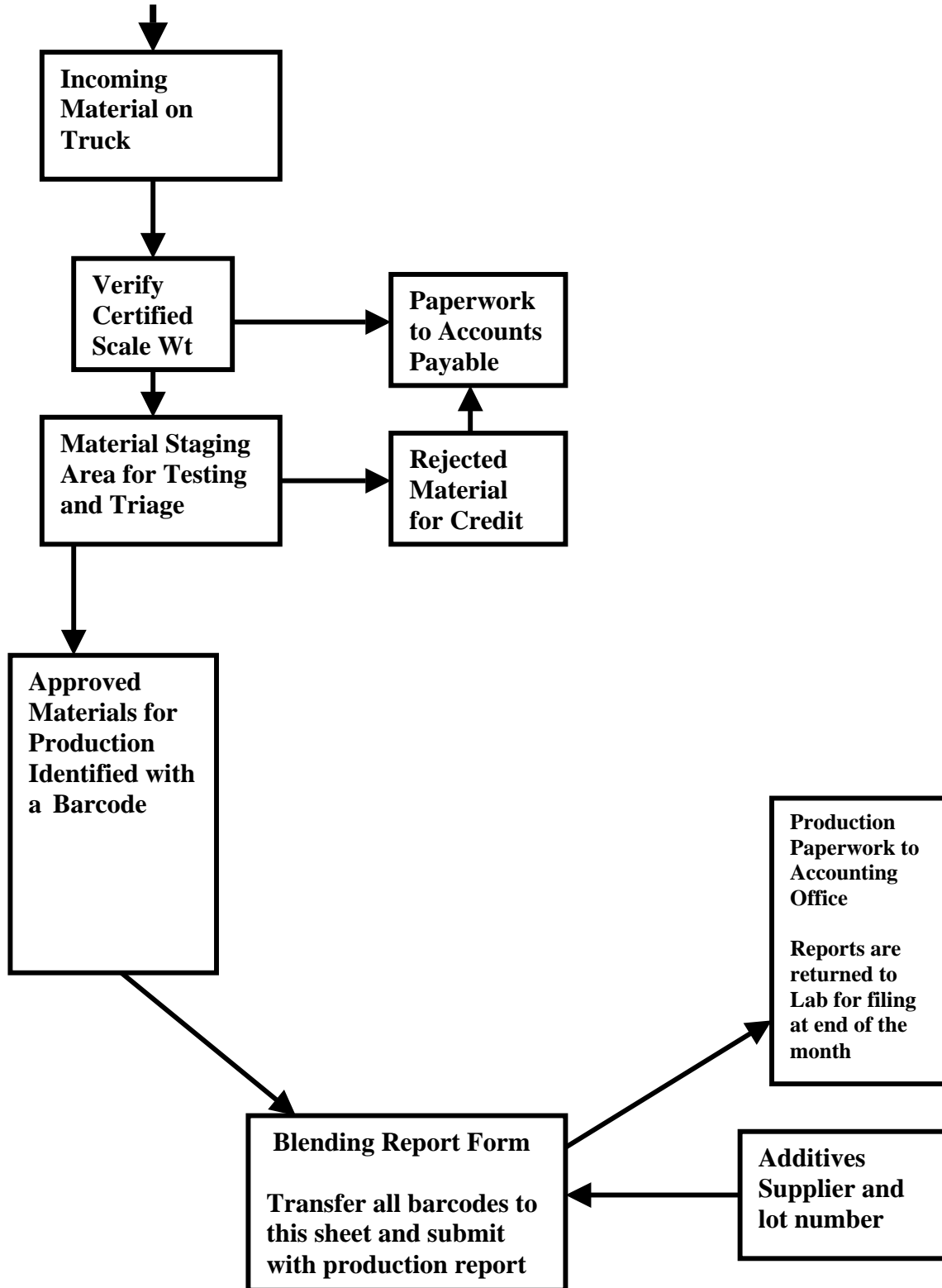
Total resin Net _____

Carbon black = Total Wt x .021 Net _____

Concentrate = Carbon Black x loading % (Dec) Net _____



Cervell Drainage Products Inc.
Raw Material Document Flow Chart
QSM 8/05





Cervell Drainage Products Inc

Production Quality Control

AASHTO M 252M Pipe

Eastern States Consortium (ESC)

Revised 05/05



Cervell Drainage Products Inc.
AASHTO Test Sampling Procedure
QSM 5/05

NOTICE

A full AASHTO test is required twice per week while producing the AASHTO/ESC grade of corrugated pipe.

Sampling Test Procedure – From start up

When a machine changeover is made to produce AASHTO/ESC pipe - the AASHTO engraved molds must be installed in the Corrugator chain as well as the current metal date coding strip, which is changed daily. After the initial process adjustments are made and the pipe is being coiled - a 12" sample will be taken to the lab for immediate testing on the L.A.B. parallel plate machine. This is an in-house test and is not an AASHTO required test.

This test is conducted to quickly verify if the three main elements of quality control are in place. The sample is tested "hot" off the line or in an "unconditioned" state. This sample should normally test within plus or minus one pound of the AASHTO pipe stiffness specification. In order for the pipe to meet this test, the density of the material, pipe weight, and material distribution must be in spec. These are the three most important quality control elements in the function of the pipe.

This procedure is used because it takes most of three days to do a full AASHTO test. The pipe must be conditioned for a minimum of 40 hours before testing. The reason for this is polyethylene continues to crystallize (density increases) at a measurable rate over the first 48 hours after production. When PE is "shock" cooled at a rapid rate, the density is modified downward. Ideal and radical lab tests have indicated changes in density as much as .010 (Example: .950 to .960) This was determined by comparing melt index samples that were very slowly air cooled to those quickly quenched in ice water. Of course our process is not that radical so we are not going to see this much change.

After 40 hours the pipe stiffness test will increase normally by 4 PSI. It is this final test that must pass the AASHTO specification. The immediate "hot" or "unconditioned" test will give us a heads-up if there is a problem with any of the three main quality elements that we discussed. We can make a lot of pipe in 40 hours. We don't want to have to downgrade that

much production to ASTM pipe, which has a lower pipe stiffness specification.

Sampling Procedure

The first one foot sample goes to the lab immediately - as discussed above.

Here are the required samples for a full AASHTO test.

Stiffness and pipe flattening 3 – 12” samples.

Elongation 3 – 51 3/16” samples

Stress cracking 3 one corrugation samples

Cold brittleness test 3 – six foot samples

Low temp flexibility test 3 – six foot samples

Coupling joint integrity 2 – twelve inch pieces

Pipe samples to include engraving and date stamp

Summary of needed samples

7 - seventy-two inch samples

3 - fifty-two inch samples

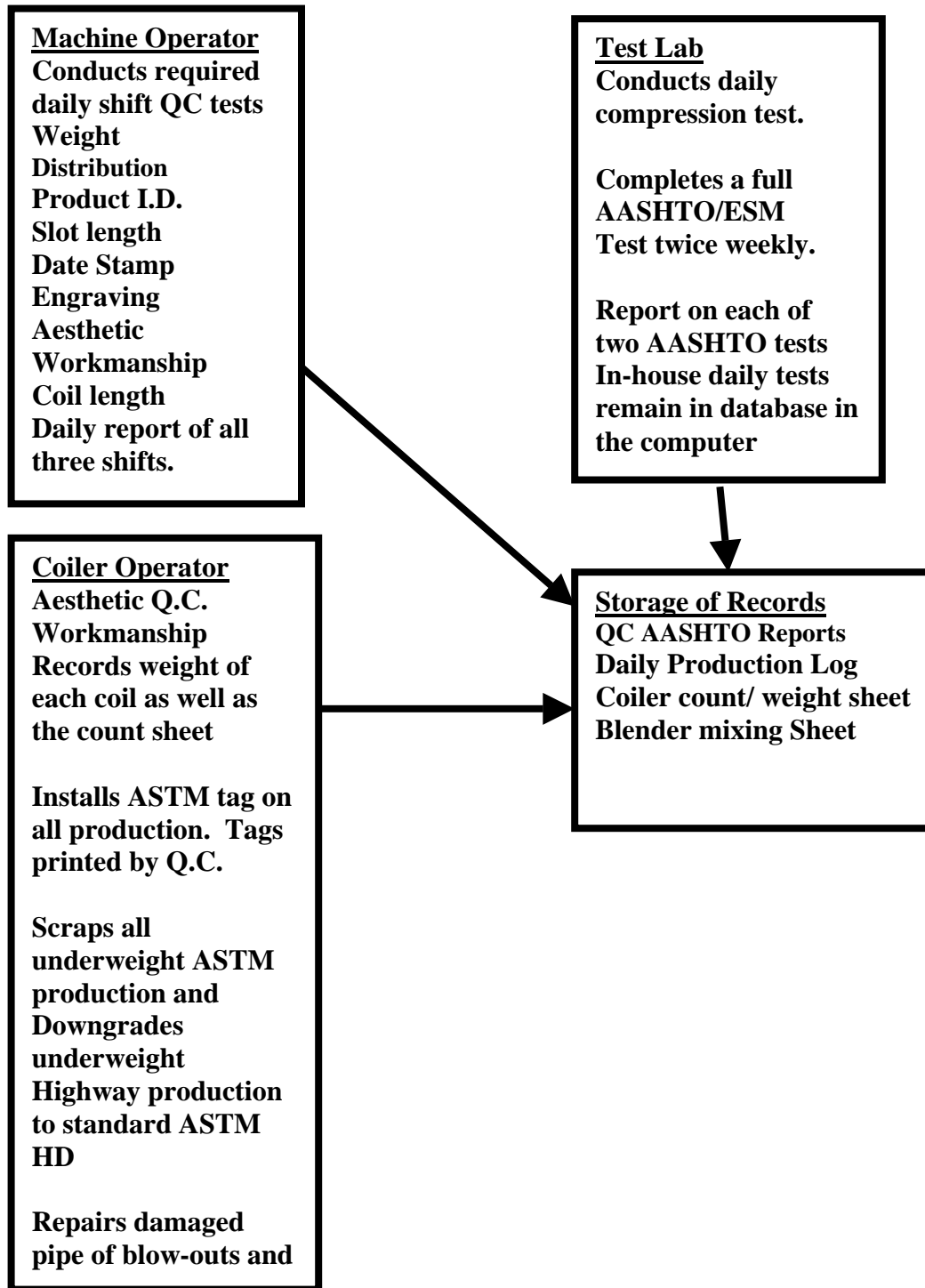
After 40 hours of conditioning at the specified room temperature, three of the seventy-two inch samples will be placed in the freezer at 25 degrees for twenty-four hours for the low temperature flexibility test. A second set of three seventy-two inch samples will be placed in the freezer at zero degrees F for one hour for the low temperature brittleness test. Since we have only one freezer, we will make both tests at zero degrees F.

The three 52” samples will be used in the elongation test. The remaining single seventy-two inch piece will be cut for the remainder of the tests.

These needed samples will be delivered to the lab by the machine operator within two hours after the changeover start-up and on every third day of production, before noon, for the entire production run. Samples are cut sequentially off of the production stream. Be sure to mark the date and time that the samples were taken from the line with a silver marker - and also mark the top leading edge of each sample for reference. Circle the engraving and date markings on the pipe.



Cervell Drainage Products Inc
Quality Control paperwork Flow Chart
QSM 5/05





Cervell Drainage Products Inc.
Production Testing Procedures
Rev4/05

Production Testing Procedures.

Quality Control

Quality control is a team effort with several levels of redundancy. Here is a listing of different plant personnel and their particular area of responsibility.

A. Production Supervisor

He has the overall responsibility to oversee quality in the manufacturing process from raw material through to loading trucks. It is his job to follow up on our standard procedures to see that all personnel implement them on a continual basis.

B. Machine Operators – Three Shifts

The machine operators are responsible for logging QC data on an hourly quality sheet showing the measured parameters like weight and distribution. We use a single daily Quality Control Log sheet for all three shifts. They also make the necessary quality control adjustments to the machinery. The raw material usage is also recorded on this sheet in order to tie it to the finished product.

The dayshift machine operator changes the required date stamp daily in the mold chain. Production is keyed to a 24-hour period, which in our case would be a single lot. He also changes the engraved molds while switching between AASHTO and ASTM HD pipe grades. AASHTO pipe and ASTM engraving are both run on AASHTO pipe but the AASHTO engraving is removed while running ASTM HD pipe products.

C. Coiler Operator

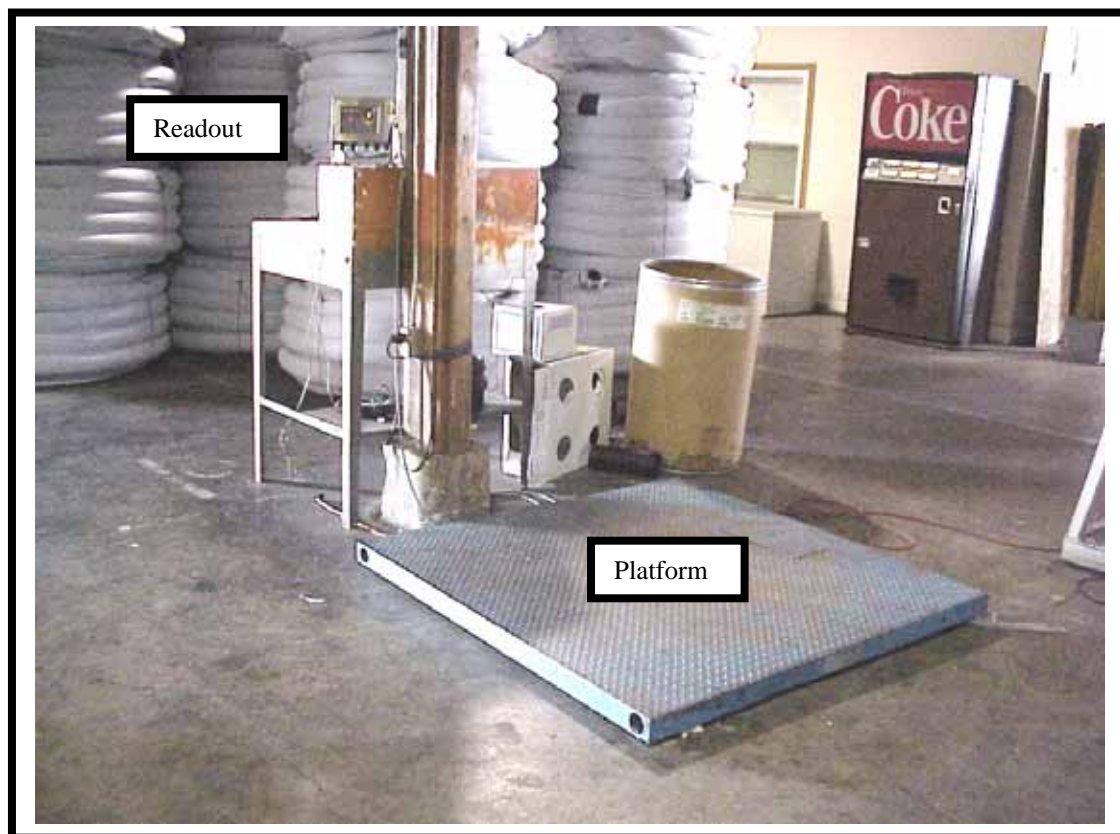
The coiler operator handles every foot of product and is key in maintaining visual, esthetic, and functional quality control. He has a written job description.

The coiler operator has a listing of the minimum coil weights for each size and product. If the heavier highway pipe coils (AASHTO) are below minimum, they are downgraded to ASTM heavy Duty - assuming they are

not under the minimum weight for ASTM HD. If any coils are under the minimum coil weight – they are ground up and recycled through the process. Most of the time our ASTM HD pipe passes AASHTO specifications, but we have always run highway (AASHTO) pipe heavier in order to have a margin of safety.

In addition, the coiler operator makes a redundant weight check of the product to each coil of pipe coming off of the production line - with the exception of the large maxi coils. It is our experience that the two most significant quality factors are the material density and the weight per foot of the product.

Each individual coil is weighed and the weight recorded on a production log sheet. See Picture of platform scale shown below.



C. Quality Control Operator

The full time quality control technician does at least one “Hot” test on production every day - usually after a material change in the process. Since it takes 24 hours to properly condition the pipe for testing - the results come on a delay. This means that one could produce sub-standard product for 24 hours before it is discovered. This is too much pipe either to downgrade or grind up.

In order to circumvent this from happening, we do a “Hot” test of pipe coming off of the production line. This “Hot” pipe will always test lower by 3-4 PSI compared to pipe that has been conditioned in the lab at controlled temperatures for 40 hours. The density increases slightly in 40 hours. But if this unconditioned hot pipe - fresh off of the line - approximates the minimum compression test, then we know it will be improved by 3-4 PSI the following day after it has been conditioned and retested. (See L.A.B. Parallel Plate tester below.)



According to the Revised specifications set forth by the ESC, we have amended our procedures to include the following...

Two full AASHTO tests per week.
One color burn off per day



Cervell Drainage Products Inc.
Highway Pipe Mfg Specifications
QSM 5/05 AASHTO M 252 M 96

AASHTO M 252 M Summary

- Specification covers sizes up to 8" I.D. (max 250mm)
 - Cervell pipe is type CP (type C with class 2 perforations)
 - PE materials cell class 324420C per ASTM D 3350
 - Higher cell classifications acceptable if specs are met
 - We use cell class 3 & 4 materials and code C (min 2% carbon black)
 - Carbon black content maximum of 5%
 - Reworked material acceptable if cell class requirements are met
 - Ends must be cleanly cut
 - Inside diameter +4.5% to -1.5%
 - 4" 4.180" to 3.994"
 - 6" 6.270" to 5.910"
 - 8" 8.360" to 7.880"
 - Measure I D with calipers 45 degrees apart – average four readings
 - Length not less than 99% of stated length
 - Length to be measured when pipe is relaxed
 - Max gap between pipe and fitting is 3mm (.118")
 - 4" & 6" slot width max 3mm (.118") - max slot length 25mm (.984")
 - 8" max slot width 3mm (.118") – max slot length 30mm (1.180")
 - Minimum inlet area – 20cm²/meter (3.1 sq in m)(1 sq in per foot)
 - Pipe stiffness – 240 n/m/mm at 5% (35 psi min)
 - Three samples – ASTM D 2412 Cut to 300 + - 10mm (12")
 - Rotate each sample by 45 degrees - seams on sides to start
 - A preload of 20 + - 5 Newtons may be used (4.5 pounds)
 - Pipe flattening – no visible defects at 20% deflection
 - Elongation 1.3m sample (51 3/16") - tare .018 kg/mm of dia of pipe.
 - 4" tare 4# (4" pipe = 101.6mm ID)
 - 6" tare 6# (6" pipe = 152.4mm ID)
 - 8" tare 8# (8" pipe = 203.2mm ID)
- Test weight .090kg/mm
- 4" test 20# for three minutes
 - 6" test 30# for three minutes
 - 8" test 40# for three minutes

mark off 760mm in center (30") after 3 minutes – remeasure to nearest 1/16" - calculate elongation in percent

$$E = \frac{(\text{elongation in inches} \times 100)}{30} \%$$

Three samples will be tested

The average elongation shall be 10% or less.

- **Environmental stress cracking** ASTM 1693 – 3 specimens – 90 deg arc w/o perforations - reduce cord length 20% and secure. Immerse in Egepal CO-630 at 50 degrees C + - 2 degrees (120F) for 24 hours – inspect for crazing.
- **Cold Temperature Brittleness Test**
Cut three 150mm long (6") samples from one continuous length of "pipe - condition at -18C + - 3 degrees (0 degrees F) for a period of one hour. Drop a 9.5kg (21lb.) plate from a height of 500mm (19 3/4") (19 3/4" from top of specimen) within 30 seconds. Cracks originating from a slot, which are no longer than 10mm (.4) in chord length will not be cause for rejection. Splits on seams are not material but process related problems. Splits on the vertical seam should not exceed 50mm (2") in chord length. Place seams on the side for testing.

***Low Temperature Flexibility**

Three samples 150mm long (appx 6 ft) condition 24 hours at -4 +-2 degrees C (25F) 200mm and less bend over 380mm (15") diameter within 30 seconds from removal from freezer – bend 180 degrees. Inspect for cracking.

***Couplings**

Joint Integrity – Duplicate stretch test using lengths (2) of pipe 150mm (6") install coupling in middle for integrity test. Coupling must support weight.

Strength

Take joint integrity test sample and do a parallel plate test at 12.5 mm/minute (1/2 inch per minute) Compress to 20 percent of sample inside diameter. Inspect for damage before and after sample is removed from the compression tester.

Marking

Pipe to be marked at intervals no greater than 3.5 meters (11.5 feet) as well as the fittings. Will include mfg. name or trademark. Nominal size AASHTO designation M252 M. Plant location and the date of manufacture.



Cervell Drainage Products Inc.
Highway Pipe Mfg Specifications
QSM 5/05 ESC/AASHTO M 252 M 96

ESC Requirements

- **Unit weight, three per work shift**
- **Wall thickness, three per work shift**
- **Carbon Black Content, one per day**
- **Inside Diameter, one per work Shift**
- **Pipe Length, one per work shift**
- **Perforation Locations and Dimensions one per work shift**
- **Water inlet Area one per work shift**
- **Pipe Stiffness, two per week**
- **Pipe Flattening, two per week**
- **Elongation, one per week**
- **Low Temperature Flexibility, one per week**
- **Brittleness, two per week**
- **Joint Integrity, one per week**
- **Environmental Stress Cracking, one per week**
- **Workmanship, AASHTO M252 M**
- **Marking AASHTO M252 M**



**Cervell Drainage Products Inc
Plant QC Job Descriptions
QSM 4/05**

Production Supervisor

The Plant manager has the primary responsibility for organizing, updating, and establishing the quality control program. The production supervisor is responsible to see that the control procedures are carried out on a daily basis by all shifts.

Shift Forman/Line Operator

In our operation, the foreman is also the machine operator. The foreman's responsibility is to respond to any alarm expressed by the coiler operator as to any detectable defect and to make a disposition of the present product being produced as well as material already produced. The Foreman is also the one who is responsible for correcting the condition of the process producing a defect in the pipe. If he is not able to make a correction based on his own capabilities, he has instructions to alert the next levels of authority, which is the Production Supervisor or the Plant Manager.

The Foreman/line operator also has his own quality control duties, not to exclude the same visual and esthetic scrutiny as the coiler operator. He tests a one-foot section of pipe from the production stream at random at least three times a shift, and completes the required checks on the samples According to the requirements listed on his Quality Control log sheet. (see page 44) The daily samples are saved for a period of twenty-four hours for scrutiny by the Production Supervisor.

Coiler Operator – Quality Control

The coiler (or the automatic cut off machine) cuts the pipe to length, then coils the length on a winding machine and ties it off with multiple strings. The production machine has a scaleable counter, which puts out a pulsed signal to either a paint marker, that marks the pipe with a short blast of

white paint, or it is used to trigger the automatic cut-off machine. The coils are then weighted to make sure they conform to the minimum weight specification. If they do not - the coil must be scrapped and ground up or if it is highway grade it may be downgraded to ASTM HD pipe if it meets the minimum weight spec.

Good production is then either loaded directly onto a semi-trailer for shipment or more commonly on the small black trailer used to move production to the 100,000 square foot concrete storage yard. Each coil must be tagged with a sticker, which is filled out with the appropriate information and attached to one of the strings around the coil. This must be done in order to conform to ASTM standards. It is not required on AASHTO pipe, but we still install the sticker for our own use in identifying any possible quality problems, which will in all probability show up at or before installation. The stickers will identify the shift and persons who coiled and produced the pipe. We do not weigh the maxi coils.

The coiler is also the key quality control person at the plant. Every single foot of pipe passes through the coiler's hands. He should always be on the alert for thin streaks in the pipe, bad seams, slotter tails, distorted or collapsed corrugations, and blowouts, and any other physical and visible defects in the pipe. These should be brought to the attention of the line operator.

Also any miscuts or blowouts must be cut out of the production stream and a coupling must be installed to make the repair. There are two exceptions: ASTM HD four-inch and six-inch solid vacuum pipe cannot be spliced. If a blowout occurs – the entire length must be ground up. Our customers who use our pipe as vacuum hose have major problems with repair couplings in the pipe. This would include 6" – 100 foot solid, 4" - 100 and 250 foot solid pipe production. All other production may use repair couplings sparingly.



Forms and Records



Cervell Drainage Products Inc.
AASHTO Lab Test Report
QSM 5/05

Date ____/____/____ Pipe Size _____ Mfg. Date ____/____/____

Resin Designation _____ Carbon Black % _____ Pass ____ Fail ____

Pipe Weight Per Foot (3 Samples) _____ Pass ____ Fail ____

Pipe I.D. TB ____ SS ____ RD ____ LD ____ Avg. _____ Pass ____ Fail ____

Slot Width Pass ____ Fail ____ Total Inlet Area _____ Pass ____ Fail ____

Slot length Min. _____ Max. _____ Avg. _____ Pass ____ Fail ____

Pipe Stiffness – See attached L.A.B. Test Form _____ Pass ____ Fail ____

Pipe Flattening Test (3 samples @ 20%) _____ Pass ____ Fail ____

Elongation Test (3 samples) _____ Pass ____ Fail ____

Environmental Stress Cracking (3 samples) _____ Pass ____ Fail ____

Cold Temp Brittleness Test (3 samples) _____ Pass ____ Fail ____

Low Temperature Flexibility Test (3 samples) _____ Pass ____ Fail ____

Couplings – Joint Integrity Test _____ Pass ____ Fail ____

Couplings – Strength Test _____ Pass ____ Fail ____

Markings:

Cervell _____ “I. D.

AASHTO M 252

LORDSTOWN, OHIO

Changeable Date Stamp ____/____/____ Pass ____ Fail ____

Comments _____

Form used by the lab to record
the results of a full AASHTO
product test.

HOLD

DO NOT USE THIS MAT'L

DATE _____

SOURCE _____

P O # _____ **BOX #** _____ **LBS** _____

OPERATOR _____

REASON _____

This tag holds a Gaylord of material from
being used until a disposition can be made
on it.



Date Made:
Date Tested:
Tested By:

Description:
Corrugated Polyethylene Pipe

Specifications: ASTM F405-97 Heavy Duty
AASHTO M252

(30 PSI at 5% Deflection)
(25 PSI at 10% Deflection)
(35 PSI at 5% Deflection)

	Weight(g)	Length(in)	Diameter(in)	Time made	[O]ff line or [C]onditioned
Sample A					
Sample B					
Sample C					

Sample A At seam

Deflection (%)	Def (in)	Load (lbs)	PSI	ASTM F405-97	AASHTO M252
5%	0.0	#N/A	#N/A	#N/A	#N/A
10%	0.0	#N/A	#N/A	#N/A	
15%	0.0	#N/A	#N/A		
20%	0.0	#N/A	#N/A		

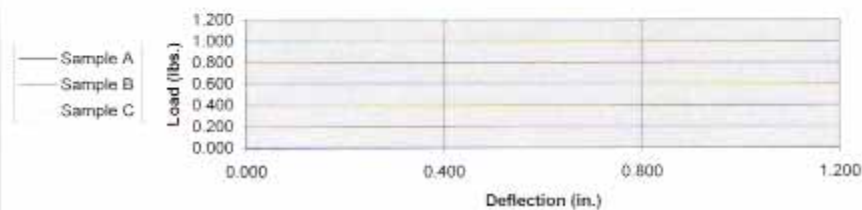
Sample B 45° from seam

Deflection (%)	Def (in)	Load (lbs)	PSI	ASTM F405-97	AASHTO M252
5%	0.0	#N/A	#N/A	#N/A	#N/A
10%	0.0	#N/A	#N/A	#N/A	
15%	0.0	#N/A	#N/A		
20%	0.0	#N/A	#N/A		

Sample C 90° from seam

Deflection (%)	Def (in)	Load (lbs)	PSI	ASTM F405-97	AASHTO M252
5%	0.0	#N/A	#N/A	#N/A	#N/A
10%	0.0	#N/A	#N/A	#N/A	
15%	0.0	#N/A	#N/A		
20%	0.0	#N/A	#N/A		

Load vs. Deflection



Lab test form generated by our compression tester. Tester software is integrated with Excel from which this form is generated. Machine has Statistical quality control capabilities but we have not learned how to utilize it. SQC would be beneficial when making bell and spigot pipe where the coupler ID and pipe OD are critical. We do not make these products.

CERVELL DRAINAGE PRODUCTS
INVENTORY TRANSFER

Rev 11/19/04

DATE _____

MATERIAL USED

SHIFT 1 2 3 BY _____

QUANTITY									OTHER	FEET	POUNDS	
_____	4"	6"	8"	SOLID	PERF	20'	100'	250'	3000'	_____	_____	_____
_____	4"	6"	8"	SOLID	PERF	20'	100'	250'	3000'	_____	_____	_____
_____	4"	6"	8"	SOLID	PERF	20'	100'	250'	3000'	_____	_____	_____
_____	4"	6"	8"	SOLID	PERF	20'	100'	250'	3000'	_____	_____	_____
_____	4"	6"	8"	SOLID	PERF	20'	100'	250'	3000'	_____	_____	_____
_____	4"	6"	8"	SOLID	PERF	20'	100'	250'	3000'	_____	_____	_____
_____	4"	6"	8"	COUPLERS	USED					_____	_____	_____
_____	15"			SOLID	PERF	20'				_____	_____	_____
_____	OTHER									_____	_____	_____

MATERIAL PRODUCED

QUANTITY										OTHER	FEET	POUNDS
_____	4"	6"	8"	SOLID	PERF	20'	100'	250'	3000'	_____	_____	_____
_____	4"	6"	8"	SOLID	PERF	20'	100'	250'	3000'	_____	_____	_____
_____	4"	6"	8"	SOLID	PERF	20'	100'	250'	3000'	_____	_____	_____
_____	4"	6"	8"	SOLID	PERF	20'	100'	250'	3000'	_____	_____	_____
_____	4"	6"	8"	SOLID	PERF	20'	100'	250'	3000'	_____	_____	_____
_____	4"	6"	8"	SOLID	PERF	20'	100'	250'	3000'	_____	_____	_____
_____	15"			CENTER CORES	PRODUCED					_____	_____	_____
_____	OTHER									_____	_____	_____
_____	OTHER									_____	_____	_____
_____	POUNDS									_____	_____	_____

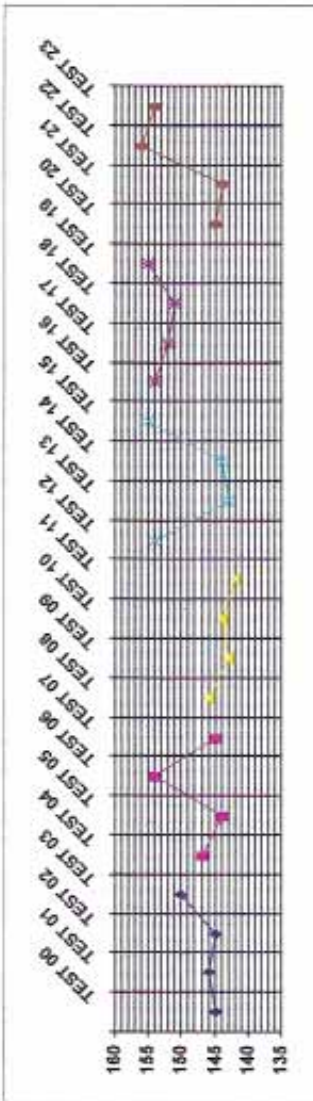
SOCK _____	LEACH BED _____
STICKS _____	CORES _____

Sheet is used to indicate when pipe already in inventory is used to make other products – like sock. Sometimes sock pipe is made in line and sometimes it is made postproduction.

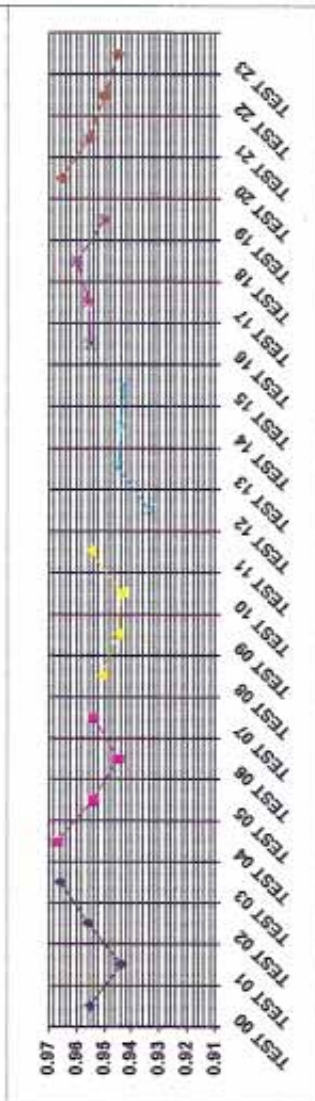


Statistical Analysis Report
4" Highway Pipe
AASHTO M252 ESC

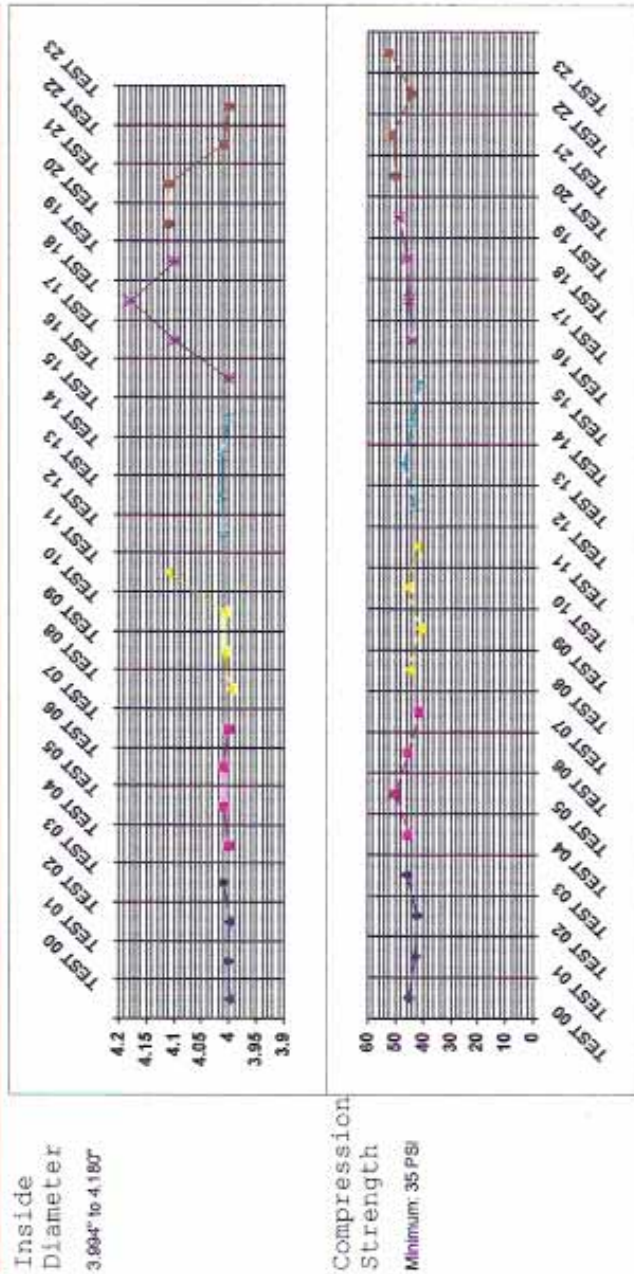
Weight
Target: 143



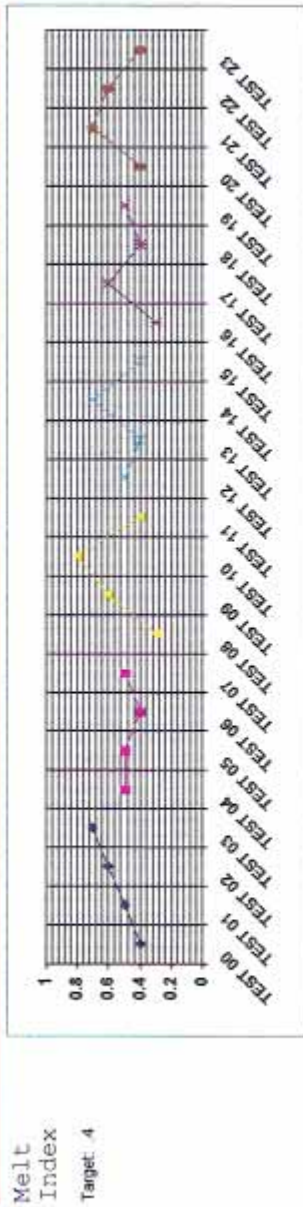
Density
Target: .955



New Page added on 10/17/05



New page added on 10/17/05



New page added on 10/17/05




DATE _____
 NUMBER OF BOXES _____
 TYPE OF MATERIAL _____


MATERIALS LAB TEST


SUPPLIER _____ CONTACT _____
 P.O.# _____ PHONE _____
 DATE REC'D _____ FAX _____


BOX #	NET #	DENSITY	COLOR	MELT INDEX	DEFECTS
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					


Lab material testing log sheet. Revised on
 10/17/05 Added melt index column.

	Product - 4" PERF HIGHWAY
	Length - 250'
	Coil # - 201
Shift _____	Coiler _____
● Date ____/____/2005 ●	

	Product - 4" Highway Perf W/ Highway Sock
	Length - 250'
	Coil # - 201
Shift _____	Coiler _____
● Date ____/____/2005 ●	

	Product - 6" HWY PERF
	Length - 100 FT.
	Coil # - 2301
Shift _____	Coiler _____
● Date ____/____/2005 ●	

	Product - 6" SOLID HIGHWAY
	Length - 100 feet
	Coil Number - 901
Shift _____	Coiler _____
● Date ____/____/2005 ●	

	Product - 6" HWY PERF W / HWY SOCK
	Length - 100 FEET
	Coil Number - 201
Shift _____	Coiler _____
● Date ____/____/2005 ●	

Examples of identification stickers attached to the binding of each coil. Required by ASTM. We also put these stickers on AASHTO products for our own benefit in tracking possible quality problems. Post production sock pipe will have two stickers – one for the manufacture of the pipe and a second to show the installation of the sock material.

CERVELL DRAINAGE PRODUCTS
COIL COUNTER SHEET

10/22/94

DATE: _____ SHIFT: 1 2 3 COILER: _____

4" 6" 8" PERF SOLID HIGHWAY 20' 100' 250' 3000' OTHER: _____

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

TOTAL: _____

4" 6" 8" PERF SOLID HIGHWAY 20' 100' 250' 3000' OTHER: _____

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

TOTAL: _____

4" 6" 8" PERF SOLID HIGHWAY 20' 100' 250' 3000' OTHER: _____

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

TOTAL: _____

4" 6" 8" PERF SOLID HIGHWAY 20' 100' 250' 3000' OTHER: _____

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

TOTAL: _____

4" 6" 8" PERF SOLID HIGHWAY 20' 100' 250' 3000' OTHER: _____

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

TOTAL: _____

This is the coiler operator log sheet where we keep track of all of the production made on each shift. The weight of each coil is recorded in the boxes.



Cervell Drainage Products Inc.
Manufacturing Q. C. log Sheet
Rev4/05

Date ____/____/____ Pipe Size _____ Prod Length _____

Weight Checks - Grams/Foot

1st 9:00am _____ 12:00am _____ 3:00pm _____

2nd 5:00pm _____ 8:00pm _____ 11:00pm _____

3rd 1:00am _____ 4:00am _____ 7:00am _____

Distribution:

9:00am Top _____ OS _____ Bot _____ BS _____ Operator _____

12:00am Top _____ OS _____ Bot _____ BS _____

3:00pm Top _____ OS _____ Bot _____ BS _____

5:00pm Top _____ OS _____ Bot _____ BS _____ Operator _____

8:00pm Top _____ OS _____ Bot _____ BS _____

11:00pm Top _____ OS _____ Bot _____ BS _____

1:00am Top _____ OS _____ Bot _____ BS _____ Operator _____

4:00am Top _____ OS _____ Bot _____ BS _____

7:00am Top _____ OS _____ Bot _____ BS _____

1st Shift Pipe I.D. SS _____ RD _____ TB _____ LD _____ Avg _____

2nd Shift Pipe I.D. SS _____ RD _____ TB _____ LD _____ Avg _____

3rd Shift Pipe I.D. SS _____ RD _____ TB _____ LD _____ Avg _____

1st Shift Perforations Max .984 Min. .400 Min _____ Max _____

2nd Shift Perforations Max .984 Min. .400 Min _____ Max _____

3rd Shift Perforations Max .984 Min. .400 Min _____ Max _____

1st Shift Coil Length Check Not less than 1% L _____ Retest _____

2nd Shift Coil Length Check Not less than 1% L _____ Retest _____

3rd Shift Coil Length Check Not less than 1% L _____ Retest _____

This is the new daily ESC/AASHTO
quality control log sheet used by the
machine operators..

CERVELL DRAINAGE PRODUCTS
INVENTORY PRODUCTION SHEET

1/23/04

DATE: _____ SHIFT 12 MID - 8 AM OPERATOR _____

QUANTITY											OTHER	FEET	POUNDS
_____	4"	6"	8"	B	W	SOL	PERF	20'	100'	250'	3000'	_____	_____
_____	4"	6"	8"	B	W	SOL	PERF	20'	100'	250'	3000'	_____	_____
_____	4"	6"	8"	B	W	SOL	PERF	20'	100'	250'	3000'	_____	_____
_____	4"	6"	8"	B	W	SOL	PERF	20'	100'	250'	3000'	_____	_____
_____	4"	6"	8"	B	W	SOL	PERF	20'	100'	250'	3000'	_____	_____
_____	4"	6"	8"	B	W	SOL	PERF	20'	100'	250'	3000'	_____	_____

SHIFT TOTALS _____

DOWN TIME _____ REASON _____

DATE: _____ SHIFT 8 AM - 4 PM OPERATOR _____

QUANTITY												OTHER	FEET	POUNDS
_____	4"	6"	8"	B	W	SOL	PERF	20'	100'	250'	3000'	_____	_____	
_____	4"	6"	8"	B	W	SOL	PERF	20'	100'	250'	3000'	_____	_____	
_____	4"	6"	8"	B	W	SOL	PERF	20'	100'	250'	3000'	_____	_____	
_____	4"	6"	8"	B	W	SOL	PERF	20'	100'	250'	3000'	_____	_____	
_____	4"	6"	8"	B	W	SOL	PERF	20'	100'	250'	3000'	_____	_____	
_____	4"	6"	8"	B	W	SOL	PERF	20'	100'	250'	3000'	_____	_____	

SHIFT TOTALS _____

DOWN TIME _____ REASON _____

DATE: _____ SHIFT 4 PM - 12 MID OPERATOR _____

QUANTITY												OTHER	FEET	POUNDS
_____	4"	6"	8"	B	W	SOL	PERF	20'	100'	250'	3000'	_____	_____	
_____	4"	6"	8"	B	W	SOL	PERF	20'	100'	250'	3000'	_____	_____	
_____	4"	6"	8"	B	W	SOL	PERF	20'	100'	250'	3000'	_____	_____	
_____	4"	6"	8"	B	W	SOL	PERF	20'	100'	250'	3000'	_____	_____	
_____	4"	6"	8"	B	W	SOL	PERF	20'	100'	250'	3000'	_____	_____	
_____	4"	6"	8"	B	W	SOL	PERF	20'	100'	250'	3000'	_____	_____	

SHIFT TOTALS _____

DOWN TIME _____ REASON _____

DOWN TIME TOTAL _____ DAILY TOTALS _____

This form is used to summarize the production for the day. These numbers are entered into the computer.

ESC Test Records Retention

All ESC test records for the last five years will be stored in the quality control testing Lab. Records six years and over will be stored in banker boxes above the lab storage area.

Statistical Quality Control

A statistical quality control has been set up using Access. See examples of our four-inch graphical print out of the database further down in this document (three pages).

Parameters include...

Material density
Compression strength
Weight
Melt index
Inside diameter

Testing Lab Standards

A listing of the standards that we use as well as the schedule of calibration frequency of our equipment will be on file in the lab for inspection. Also, a log of calibration and equipment maintenance records will be retained as well as all past ESC communications and reviews.

QC Personnel Training

Documentation on testing training will be kept on file for our lab technicians. It will be kept with other required ESC documents.

Annual Audit

A third party will select samples for our annual audit. Our local Lordstown Road supervisor will do this.

Disposition of failed tests

Test failures will be retested before a disposition is made for the production lot. If the pipe simply fails the compression test, and there are no other defects, then the pipe will be downgraded to ASTM grade pipe, which has a lower compression and weight specification. The coiler operator who weighs each coil of pipe on a platform scale also makes this disposition. Underweight coils are then labeled as Standard ASTM heavy duty – assuming they pass the ASTM specification. This ASTM pipe will be sold into the agricultural market.

If physical defects are present, like the distribution being out, open seams, or a drag-line inside of the pipe - then the pipe will have to be scrapped and ground up. As you may remember, last year we made a two-day run of ASTM HD eight-inch pipe that had one bad horizontal seam and had to be ground up: A simple process adjustment. We don't want a repeat of that ever again.

Defective product will be determined by testing - going backward in time. The product will be put on hold and sequestered from the good production. The bulk of our AASHTO or highway pipe sales is in six inch pipe, next, is four inch, but eight inch sales are almost non-existent - although we need to be certified to make it as this may change in the future.

END